

Instrumented Bit for In-Situ Spectroscopy (IBISS), Phase I

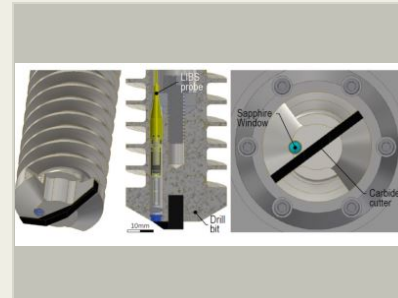
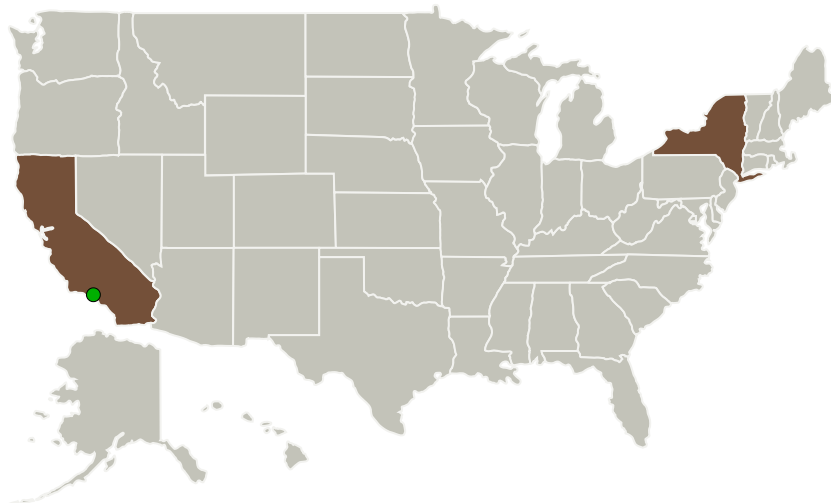
Completed Technology Project (2017 - 2018)



Project Introduction

We propose to build and critically test the Instrumented Bit for In-Situ Spectroscopy (IBISS), a novel system for in-situ, rapid analyses of planetary subsurface materials (Fig 2.1). IBISS will provide a rapid and unambiguous chemical/mineralogical characterization of subsurface materials by integrating an innovative, miniature LIBS (laser-induced breakdown spectroscopy) probe with a drill bit. Specifically, we will: 1) Design and assemble an IBISS breadboard system (Mk 1) and validate the optical circuit: Through model simulation and experimental work, we will investigate the performance of the various optical elements. We will determine the figures of merit of the laser, optical fiber, and lenses. We will use COTS or modified COTS for all optical, mechanical, and electronic systems. 2) Design and assemble an IBISS miniaturized system (Mk 2), integrate it with the drill bit, and bench test it: We will perform component integration and system testing. We will determine scientific performance parameters of IBISS and compare them to those of bench-top LIBS instruments and drilling engineering performance metrics. We will use existing, certified/ independently characterized samples of lunar and martian regolith simulant.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Honeybee Robotics, Ltd.	Lead Organization	Industry	Pasadena, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California
SETI Institute(SETI)	Supporting Organization	Academia	Moffett Field, California

Primary U.S. Work Locations

California

New York

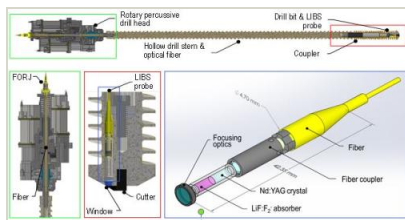
Project Transitions

**June 2017:** Project Start**December 2018:** Closed out

Closeout Documentation:

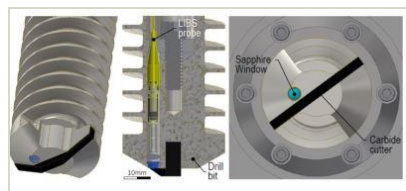
- Final Summary Chart(<https://techport.nasa.gov/file/140859>)

Images



Briefing Chart Image

Instrumented Bit for In-Situ Spectroscopy (IBISS), Phase I
Briefing Chart Image
(<https://techport.nasa.gov/image/134421>)



Final Summary Chart Image

Instrumented Bit for In-Situ Spectroscopy (IBISS), Phase I
(<https://techport.nasa.gov/image/135476>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Honeybee Robotics, Ltd.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

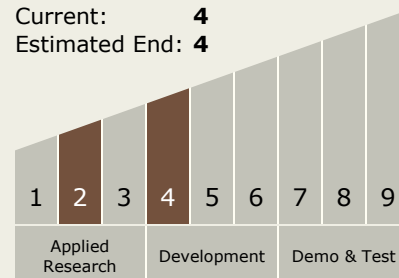
Carlos Torrez

Principal Investigator:

Pablo Sobron Sanchez

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4



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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.5 Lasers

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System